

Combination Factoring

- 1) Factor out common term
- 2) If trinomial, factor using trinomial method
- 3) If Binomial, factor using difference of two squares
- 4) 4 term, factor trinomial then factor difference of two squares. or factor by grouping.

Is the result a factored form?

- 1) Is it in a format such as $(x+y)(x+y)$
(can not be $(x+y) - (x+y)$)

- 2) Are all factors prime?

ex. $2(3x-1)(x+4)$ every factor is prime

$(6x-2)(x+4)$ not all factors are prime

- 3) * Does the factored form have the same degree as the original?

ex) $x^2 - y^2 - ax + ay$ is a polynomial of the second degree ~~xxx~~ the expression $(x-a)(y-a)(x-y)$ can not be the factored form because it is a third degree ~~xxx~~

- 4) Can you return the factored by multiplication to the original expression?

* Determining degree of a polynomial
• the highest degree out of all of the terms

• if the variable has no exponent the degree is 1

• if it is a constant term the degree is 0

• if there are multiple variable in a term we add the degrees

ex. $x^2 \cdot y^2 - ax + ay$

terms: $x^2 \rightarrow \text{degree } 2$
 $y^2 \rightarrow \text{degree } 2$
 $ax \rightarrow \text{degree } 1 + \text{degree } 1 = \text{degree } 2$
 $ay \rightarrow \text{degree } 1 + \text{degree } 1 = \text{degree } 2$
highest degree = $\boxed{2}$

ex. $(x-a)(y-a)(x-y)$

foil expression

$$(xy - ax - ay + a^2)(x-y)$$

$$= x^2y - ax^2 - axy + a^2x - xy^2 + axy + ay^2 - a^2y$$

$$= x^2y - ax^2 + a^2x - xy^2 + ay^2 - a^2y$$

terms: $x^2y \rightarrow \text{degree } 2 + \text{degree } 1 = \text{degree } 3$
 $ax^2 \rightarrow \text{degree } 2 + \text{degree } 1 = \text{degree } 3$
 $a^2x \rightarrow d3$
 $xy^2 \rightarrow d3$
 $ay^2 \rightarrow d3$
 $a^2y \rightarrow d3$
highest degree = $\boxed{3}$

Ex) $2a^2 - 2ax - 12x^2$

$$2(a^2 - ax - 6x^2)$$

$$2(a^2 - 3ax + 2ax - 6x^2)$$

$$2[a(a-3x) + 2x(a-3x)]$$

$$2(a-3x)(a+2x)$$

$a^2 - 6x^2 = -6a^2x^2$
 $-3ax \quad 2ax$

$$\text{Ex) } x(3+a) - 2(a+3) \quad \mu a + \mu a - \mu \cdot \mu \cdot x \quad .xg$$

$$3(x-2)(a+3) \quad \leftarrow \quad \mu x \quad \text{reverse}$$

$$3 \text{ reverse} \leftarrow \mu$$

$$\text{Ex) } 3x^2 - 5x - 2 \quad 3x^2 - 2 = -6x^2$$

$$3x^2 - 6x + x - 2 \quad \leftarrow \mu \quad -6x^2 \quad x$$

$$3x(x-2) + 1(x-2) = \text{reverse to find}$$

$$(x-2)(3x+1)$$

$$(\mu-x)(\mu-\mu)(\mu-x) \quad .xg$$

$$\text{Ex) } 3ax - 6bx - 4a + 8b \quad \text{NO square}$$

$$3x(a-2b) - 4(a-2b) \quad \leftarrow \mu a - \text{terms } x$$

$$\mu a - \mu a + (a-2b)(3x-4) \quad \mu x a - \mu x a - \mu^2 x =$$

$$\mu^2 a - \mu^2 a + \mu x - x^2 a + \mu x a - \mu^2 x =$$

$$\text{Ex) } 1 - 9t^2 + 12tu - 4u^2$$

square terms

$$1 + (-9t^2 + 6tu + 6tu - 4u^2) \quad \leftarrow \mu^2 - 9t^2 - 4u^2 = 36t^2u^2$$

$$1 + [(-3t)(3t-2u) + 2(3t-2u)] \quad \leftarrow \mu a$$

$$1 + (3t-2u)(-3t+2u) \quad \leftarrow x^2 a$$

$$1 - (3t-2u)^2 \quad \leftarrow \mu x$$

$$(1 + 3t - 2u)(1 - 3t + 2u) \quad \leftarrow \mu a$$

$$ab \leftarrow \mu a$$

$$[3] = \text{reverse to find}$$

$$\text{Ex) } 2x^2 - 9x - 15x_2$$

$$2(x_2 - 9x - 15x_2)$$

$$2(x_2 - 9x + 9x - 15x_2)$$

$$2[(x_2 - 9x)(x_2 + 9x) + (x_2 - 15x_2)]$$

$$2(x_2 + 9x)(x_2 - 15x_2)$$